

15

ram form an angle with respect to the direction in which the ram is moved.

33. Apparatus for disconnecting the lower threaded end of an upper section from the upper threaded end of a lower section of a pipe string extending through a wellhead bore, comprising a housing adapted to be connected as a part of the wellhead, said housing having a bore therethrough to form a portion of the wellhead bore and to receive the ends of said sections, and a guideway extending outwardly from the bore, means in the housing for holding said lower section against movement, and a ram longitudinally reciprocable within the guideway, said ram including means for engaging the upper section, as the ram moves longitudinally within the guideway, and for exerting a force on said upper section tending to rotate it about its axis, in response to further longitudinal movement of the ram within the guideway.

34. Apparatus of the character defined in claim 33, wherein said housing had additional guideways extending outwardly from the bore thereof below the first-mentioned guideways, and said holding means includes additional rams each longitudinally reciprocable in one of said additional guideways and having a recess therein to fit about a portion of said lower section.

35. Apparatus for disconnecting the lower threaded end of an upper section from the upper threaded end of a lower section of a pipe string extending through a wellhead bore, comprising a housing adapted to be connected as a part of the wellhead, said housing having a bore therethrough to form a portion of the wellhead bore and to receive the ends of said sections, and a pair of oppositely disposed guideways extending outwardly from the bore, means in the housing for holding said lower section against movement, and a ram longitudinally reciprocable within each guideway, each ram including means for engaging the upper section as it moves longitudinally within the guideway, said means of at least one of the rams including means for exerting a force on said upper section tending to rotate it about its axis, in response to further longitudinal movement of one ram within the guideway.

16

36. Apparatus of the character defined in claim 35, wherein said housing has additional guideways extending outwardly from the bore thereof below the first-mentioned guideways, and said holding means includes additional rams each longitudinally reciprocable in one of said additional guideways and having a recess therein to fit about a portion of said lower section.

37. For use in disconnecting the lower threaded end of an upper section from the upper threaded end of a lower section of a pipe string which is supported and held against rotation in a relatively fixed axial position within the bore of a housing connected as a part of an underwater wellhead, and with the upper section disposed opposite a guideway in the housing extending outwardly from the bore; apparatus comprising a ram including a carrier slidably movable longitudinally within the guideway toward and away from the bore, a jaw mounted on the carrier for longitudinal movement therewith, said jaw having a rough surface for engaging the upper section, in response to movement of the carrier longitudinally within the guideway, and means for moving said jaw transversely of the carrier so as to cause said rough surface to move along a side of said upper section in response to further longitudinal movement of the carrier within the guideway.

38. Apparatus of the character defined in claim 37, wherein said means comprises a cam surface of the jaw forming an acute angle with respect to the rough surface and slidably movable over a cam surface of the carrier so as to wedge said rough surface against said upper section.

39. Apparatus of the character defined in claim 38, including a spring engaging the jaw and carrier to yieldably urge the jaw to a position in which its rough surface is arranged to so engage the upper section.

40. Apparatus of the character defined in claim 38, wherein the rough surface of the jaw extends at an angle to the direction of movement of the carrier, so that the cam surface of the jaw slides over the cam surface of the carrier as it moves along a side of said upper section.

41. A ram jaw of the character defined in claim 22, wherein one end of the hole is counterboard.

* * * * *

45

50

55

60

65